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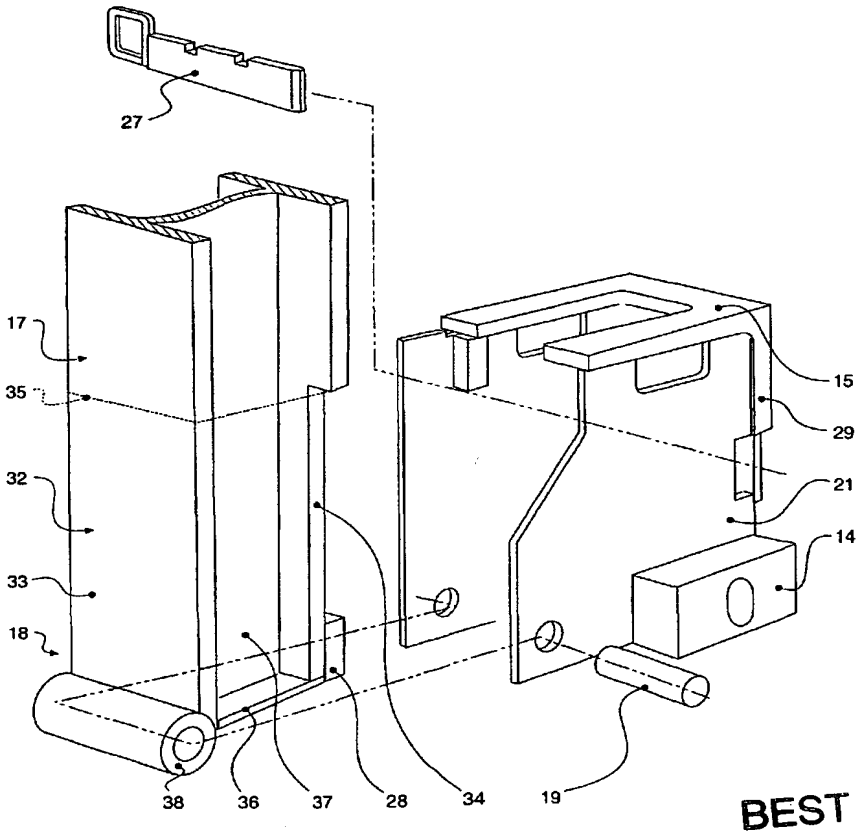
*[Continued on next page]*

(54) Title: HINGE FOR COLLAPSIBLE FLATRACK

(57) Abstract: A hinge (26), for a collapsible flatrack container (11), is fabricated of multiple elements, including a hinge inner portion, with discrete opposed flanges (33, 34, 35, 36), and an intervening web (37), such that relative flange and web, depth and disposition, can be configured to optimise any of weight, strength or cost considerations.

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Hinge for Collapsible Flatrack

A common collapsible flatrack shipping container configuration comprises a (rectangular) platform base, with opposite (inward) folding end walls.

End walls are typically carried between folding corner posts, themselves pivotally mounted upon the base.

Both end walls folded down upon the base serves as a compact collapsed mode, for economical transport and storage - also allowing mutual stacking in a return-empty mode.

Such flatracks are vulnerable to rough handling in service, there being no superstructure between opposite end walls to help keep them upright.

The end walls are secured at each base corner by a lockable hinge.

Given a shortage of proper lifting equipment to suspend flatracks by top corner fittings under vertical loading, there is a temptation to use inclined slings.

Slings tend to pull the end walls inwards - risking hinge, or corner post failure.

Commercial considerations demand low cost corner post and hinge strengthening, to help withstand such bending loads.

Thus one stronger flatrack type uses an 'I' section corner post, which is very resistant to bending.

Such an 'I'-post is typically mounted upon an inner hinge portion configured as a solid plate.

However, solid plate hinges are extremely heavy and expensive to make.

Thus the plate has to be drilled through accurately, to accommodate pivot pins, and locking pins which lock the hinge in the open position with end walls erect.

Market trends are for taller containers, with taller corner posts.

The taller the posts, the greater the racking forces near the hinge and post bases - so again strengthening is desirable to resist these forces.

It is also desirable for containers to carry more payload per consignment.

Taller, heavier cargos require a lighter weight flatrack.

Thus a lighter weight, stronger and cheaper hinge is desirable in collapsible flatrack construction.

Statement of Invention

According to one aspect of the present invention,
a hinge comprises
an inner portion,
of multiple elements,
including opposed flanges,
with an intervening web,
of bespoke configuration and relative disposition.

In a particular construction,
a hinge inner portion,
for a collapsible flatrack,
comprises a composite beam,
of multiple discrete web and flange elements,
mutually assembled and secured.

A (fabricated) hinge construction may be employed,
for mounting a folding corner post and/or end wall,
upon a platform base
of a collapsible flatrack container,
the hinge comprising
an inner portion,
carried by a pivot pin,
captive in a hinge outer portion,
in turn secured to the platform base,
and fabricated of multiple discrete elements,
including opposed flanges,
with an intervening web.

Fabrication from multiple elements allows judicious adoption of bespoke flange and web profiles to suit loading, such as with differential flange width.

Hinge flanges are desirably configured to unite
with corresponding corner post flanges, by, say, end abutment, overlay, superimposition or mutual inset.

A laminated construction may be employed,
with a plurality of juxtaposed web plates,
secured (eg welded) together,
and/or between common individual flanges,
or multiple juxtaposed flange portions.

Fabrication of discrete elements could admit replaceable / demountable web and/or flanges,
allowing (re-)assembly in different configurations.

Conveniently, an outboard flange is profiled locally,
such as with a cut-out or recess, to accommodate a hinge locking detent.

Alternatively, an outboard flange may be profiled,
with corresponding web span, to achieve a waisted overall profile, with superimposed

blocks secured outboard thereof, to define an intervening recess or cut-out.

Fabricated, forged or cast construction may be used for component elements, individually or collectively, to meet individual and/or collective loading.

Respective profiles of hinge (inner portion) and corner post are configured to meet anticipated loading and to allow secure post mounting.

A joint between hinge and post may incorporate some relative mating, interfit or overlap.

Alternatively, a 'butt' (abutment) joint between respective profiles, or a hinge top flange plate and post end, might be employed.

Post sections include, 'I' beam, 'U' or 'C' sections, hollow or solid rectangular tubular forms.

Similarly, hinge inner portion forms include 'I' beam, 'U' or 'C' sections.

A hinge outer portion is conveniently a 'U' or 'C' throat section to receive a hinge inner portion.

This may also be a fabricated or mixed fabrication, casting or forging.

Should part of the hinge inner portion be damaged, the damaged part may be burnt off from the hinge inner portion and a new part welded in place, rather than having to replace the whole and costly hinge inner plate.

Supporting Embodiments

There now follows a description of some particular embodiments of the invention, by way of example only, with reference to the accompanying diagrammatic and schematic drawings, in which:

Figure 1 shows a side elevation of a collapsible flatrack;

Figure 2 shows an enlarged view of a conventional end wall (corner) post bottom hinge for the flatrack of Figure 1;

Figure 3 shows an enlarge view of an end wall (corner) post bottom hinge fabricated alternative for the flatrack of Figure 1;

Figure 4 shows a variant fabricated hinge to that of Figure 3;

Figures 5A and 5B show comparative sections of hinge inner portions;

More specifically:

Figure 5A shows a conventional solid plate hinge inner portion located in a hinge outer throat;

Figure 5B shows a corresponding view to Figure 5A, but for a fabricated 'I'-section hinge inner according to the invention, with differential opposed flange widths and a relatively slender intervening web;

Figures 6A and 6B show exploded perspective views of a fabricated hinge construction of Figure 3, with a post integration option;

More specifically:

Figure 6A shows a fabricated hinge inner portion;

Figure 6B shows a hinge outer portion, pivot pin and locking bar, to receive the hinge inner of Figure 6A;

Figures 7A and 7B shows exploded perspective views of a fabricated hinge construction of Figure 4;

More specifically:

Figure 7A shows a fabricated hinge inner portion;

Figure 7B shows a hinge outer portion, pivot pin and locking bar, to receive the hinge inner of Figure 7A;

Figures 8A through 8C show side elevation views of various bottom flange and pivot boss configurations for an inner hinge portion;

More specifically:

Figure 8A shows a hinge bottom flange configured as a 'J' shaped strap, wrapped around a pivot boss and joined to an inboard flange upstand;

Figure 8B shows an 'I' beam bottom mount, with an intervening pivot boss captured in a web between flanges;

Figure 8C shows a solid block bottom flange with integral pivot boss;

Figure 9 shows a hinged post bottom mounting;

Figures 10A through 10D show various post sections, taken along line 10-10' in Figure 9;

More specifically:

Figure 10A shows an 'I' section post;

Figure 10B shows a solid rectangular section bar post;

Figure 10C shows a hollow rectangular section tubular bar post;

Figure 10D shows a 'U' or 'C' section post;

Figures 11A through 11G show sectional views of various hinge inner portion forms, united with diverse post sections, taken along line 11-11' in Figure 9;

More specifically,

Figure 11A shows a solid post united with an 'I' section hinge inner portion;

Figure 11B shows a hollow post united with an 'I' section hinge inner portion;

Figure 11C shows a solid post united with a hollow section hinge inner portion;

Figure 11D shows a 'U' or 'C' section hinge inner portion united with a hollow post;

Figure 11E shows a 'U' or 'C' section hinge inner portion united with a solid post;

Figure 11F shows a hollow hinge inner portion united with a an 'I' beam post plate;

Figure 1G shows a 'U' or 'C' section hinge inner portion united with an 'I' beam post plate;

Referring to the drawings, a collapsible flatrack 11 has a platform base with a floor surface 12 surmounted at opposite ends by folding end walls 13 carried between hinged corner posts 17.

At each bottom corner there is a corner fitting 14 and a base 20, into which is fitted a hinge inner portion 18, captured by a pivot pin 19.

The hinge outer portion 21 has a top (plate) fitting 15, through which hinge inner portion 18 passes when an associated corner post 17 is erected into a vertical position.

At the top of each corner post 17 is a top capture fitting 16, to which is attached a hook 22 termination to one end of a suspension sling 23.

Opposed limbs of sling 23 are inclined to the vertical 'V' by angle 'A'.

If the flatrack 11 be lifted by sling 23, a horizontal component 'H' is generated in top fittings 16.

This imposes a considerable bending movement upon both the hinge inner portion 18 and outer portion 21.

In Figure 2 the hinge outer portion 21 is part cut-away, to reveal a hinge inner portion 18, configured as an 'L' shaped profile in heavy plate.

Typical plate thickness would be some 60mm.

A top (plate) fitting 15, shown in section, is part-cut away, to receive inner portion 18.

Pivot pin 19 is secured to base 20.

A corner post 17 is attached to the upper end of inner hinge portion 18 - typically by heavy duty welding between opposed flanges 24 and 25.

In the erect position shown, the hinge 26 - of outer portion 21 and inner portion 18 - is prevented from folding down upon base 20 by a locking pin 27.

Locking pin 27 blocks movement of a heel 28 of inner portion 18 and a back plate 29 of top fitting 15.

Only when pin 27 is withdrawn can heel 28 pass back plate 29 and allow the hinge inner portion 18 - with attached corner post 17 - to fold through some 90° upon (contacting or marginally overlying) base 20.

With hinge 26 locked and corner posts 17 erect, it is important to maintain top fitting 16 geometry, for interface, without adjustment, with standardised handling equipment or other containers.

It is important that pivot pin 19 and locking pin 27 locate accurately with heel 28 and back plate 29, to stop post 17 wobble.

Thus, in manufacture of hinge inner portion 18, the recess 30 into which locking pin 27 fits, and pivot pin 19 position in relation to locking pin 27 and recess 30 must be accurately machined, to maintain geometry.

However, inner portion 18 typically weighs some 50 or 60 kilos, reducing opportunities for high speed CNC machining.

In Figure 1, strengthening of, say, right hand corner post 17 would most economically be done so by increasing its depth, to chain line 17'.

In Figure 2, for increased post 17 depth, flange 25 is depicted repositioned to chain lined flange 25'.

Likewise, the hinge inner portion 18 must also be increased in depth to maintain strength, so leading face 31 is depicted reposition to chain line face 31'.

However, this desirable substantial strength increase brings an undesirable weight and cost penalty.

Figure 3 shows a fabricated multiple portion hinge embodiment of invention.

More specifically, a thick plate hinge inner portion 18 is replaced by a fabricated inner hinge portion 32.

The fabrication comprises an inboard flange 33, an outboard flange 34, with an intervening web 37 and top and bottom end flanges 35 and 36.

Web 37 might comprise one or more relatively thin plates (ie a lamination), joined by a peripheral weld to flanges 33, 34, 35, and 36.

Corner post 17 has an inboard flange 25', juxtaposed with inboard hinge flange 33.

For a narrower or wider corner post and hinge, inboard flange 33 is readily transposed to juxtapose with relocated corner post inboard flange 25', merely by adopting an appropriate size of web 37.

An inboard offset pivot boss 38 is configured as a stub tube fitted at the junction of flanges 33, 36.

In production, outboard flange 34 has recess 30 machined in it as previously, but in this example is very much lighter weight than thick plate hinge inner portion 18 - so can be hand fed to a CNC machine tool for very quick, low cost, and accurate machining.

Similarly a pivot boss 38 can be machined as a small component upon a lathe, with through hole bored out accurately.

By careful jigging, components can be positioned, clamped together and welded, manually or robotically - without further machining of hinge inner portion 32.

In terms of bending plane stress of Figure 3, web 37 can be relatively thin, say as little as 10mm, compared to a heavy hinge plate 18 some 60mm deep.

In an alternative fabricated construction of Figure 4, flange 34 might be made from a rolled bar, some 60mm wide by 30mm thick - cut to length and formed at 34' to meet a corner post flange 25.

Recess 30 can be provided by addition of a steel block 40, welded at 41 to flange 34 - saving machining cost, yet providing an abutment 42 to engage locking pin 27.

Figure 5A shows a top plate fitting with an open-sided aperture 44 of standard width W, say 62.5mm - contrived to mate with known handling equipment and coupling devices, such as twistlocks.

When in the erect position shown, the hinge inner portion 18 cannot be made any wider than 'W' - and is typically some 60mm wide, of solid plate.

Figure 5B depicts a fabricated hinge inner portion 32, with flanges 33, 34 and web 37, according to the invention.

Whereas outboard web 34 must be of some 60mm span, to pass through width Wx of aperture 44 in the hinge outer portion and top capture fitting 15, the inboard flange 33 can be made wider Wy, as shown.

The cost of profiling a 60mm thick steel plate is great compared to thinner, say 10mm, web plate 37.

In bending in the vertical plane, as experienced under inclined sling lifting loads, flanges 33, 34 of hinge inner portion 32 are stressed to a higher level than web 37, given their greater distance from the hinge inner neutral axis, of chain line 43 in Figure 4.

Thus the yield point of the steel used for flanges 33, 34 needs to be higher than needed for web 37, to resist bending loads.

In the prior art, the whole of a single piece of plate 18 must be formed from high yield point steel - an inefficient use of material adding further to cost.

Availability of high yield steel plate is not as good as bar steel used in flanges 33, 34.

Moreover, where very high yield steel of weldable grade is needed, such 60mm plate is unavailable.

Thus a hinge of equivalent strength to a hinge inner made with flanges 33, 34 could not be constructed.

In Figure 5B, the width of outboard flange 34 cannot exceed the 62.5mm width W of aperture 44, through which it should pass when corner post 17 is erect.

For geometric reasons, outboard flange 34 is therefore made some 60mm thick.

However, inboard flange 33 does not pass through the aperture and so can be made wider.

Fabricated, say welded plate, hinge components could be combined individually or collectively with, or replaced in whole or part by, say forging or casting.

Thus, flange 34 could be forged with recess 30 from a single piece of bar steel.

Similarly, an entire hinge inner portion 32 could be a unitary forging or casting, with integral recess 30, flanges 33, 34, web 37 or end plates 35, 36.

Boss 38 might be formed separately for welded attachment to the forged component.

Although an 'I'-section hinge inner portion 32 has been described, in principle other forms could be employed, such as 'U' or 'C'-sections.

Figures 6A, 6B and 7A, 7B present an exploded perspective of hinge construction, with interfitting inner and outer hinge portions, and providing a post mounting - and are generally self-explanatory, so will not be described individually in detail.

An option of a contiguous corner post is depicted in Figure 6A.

Similarly, Figures 8A through 8C explore hinge bottom flange and pivot mounting diversity - and are generally self-explanatory, so will not be described individually in detail.

Figures 9, 10A through 10D, & 11A through 11G explore diversity of post and hinge mounting - and are generally self-explanatory, so will not be described individually in detail.

Fabrication from multiple elements enables reduced replacement costs when only part of the hinge is damaged.

Component List

| | |
|---|---|
| 11 | collapsible flatrack |
| 12 | floor surface |
| 13 | end wall |
| 14 | corner fitting |
| 15 | top (plate) fitting |
| 16 | top capture fitting |
| 17 | corner post |
| 18 | hinge inner portion |
| 19 | pivot pin |
| 20 | base |
| 21 | hinge outer portion |
| 22 | hook |
| 23 | suspension sling |
| 24 | flange |
| 25 | flange |
| 26 | hinge |
| 27 | locking pin |
| 28 | heel |
| 29 | back plate |
| 30 | recess |
| 31 | leading face |
| 32 | fabricated hinge inner portion |
| 33 | inboard flange |
| 34 | outboard flange |
| 35 | top flange |
| 36 | bottom flange |
| 37 | web |
| 38 | inboard pivot boss |
| 40 | steel block |
| 41 | block weld face |
| 42 | locking pin abutment |
| 43 | hinge inner neutral axis |
| 44 | top plate fitting aperture |

Claims

1.
A hinge (26),
comprising
an inner portion (32),
of multiple elements,
including opposed flanges (33, 34, 35, 36),
with an intervening web (37),
of bespoke configuration and relative disposition.

2.
A (fabricated) hinge,
according to Claim 1,
configured for mounting
a folding corner post and/or end wall,
upon a platform base
of a collapsible flatrack container,
the hinge comprising
an inner portion,
carried by a pivot pin,
captive in a hinge outer portion,
in turn secured to the platform base,
and fabricated of multiple discrete elements.

3.
A hinge,
according to either preceding claim,
of laminated construction,
with a plurality of juxtaposed web plates,
secured (eg welded) together,
and/or between common individual flanges,
or multiple juxtaposed flange portions.

4.
A hinge,
according to any preceding claim,
with flanges configured to mate
with corresponding corner post flanges,
by, say, end abutment, overlay, superimposition or mutual inset.

5.
A hinge,
according to any preceding claim,
with replaceable / demountable web and/or flanges,
allowing (re-)assembly in different configurations.

6.
A hinge,
according to any preceding claim,
with differential flange width.

7.
A hinge,
according to any preceding claim,
wherein the outboard flange is profiled locally,
such as with a cut-out or recess,
to accommodate a hinge locking detent.

8.
A hinge,
according to any preceding claim,
wherein an outboard flange is profiled,
with corresponding web span,
to achieve a waisted overall profile,
with superimposed blocks secured outboard thereof,
to define an intervening recess or cut-out.

9.
A hinge,
according to any of the preceding claims,
wherein the relative flange and web,
depth and disposition,
are configured to optimise at least one of weight, strength or cost considerations.

10.
A hinge,
according to any of the preceding claims,
variously of fabricated, forged or cast construction,
for individual component elements,
to meet individual and/or collective loading.

11.
A hinge,
according to any of the preceding claims,
wherein respective profiles
of hinge (inner portion) and corner post
are configured to meet anticipated loading
and to allow secure post mounting.

12.
A hinge,
according to any of the preceding claims,
wherein a joint between hinge and post
incorporates some relative interfit or overlap.

13.
A hinge,
according to any of the preceding claims,
with a butt joint,
between a hinge top flange and post end.

14.
A hinge,
according to any of the preceding claims,
combined with post sections including, 'I' beam, 'U' or 'C' sections, hollow or solid
rectangular tubular forms.

15.
A hinge,
according to any of the preceding claims,
including 'I' beam, 'U' or 'C' sections,
for hinge inner portion forms.

16.
A (fabricated) hinge,
substantially as hereinbefore described,
with reference to, and as shown in, the accompanying drawings.

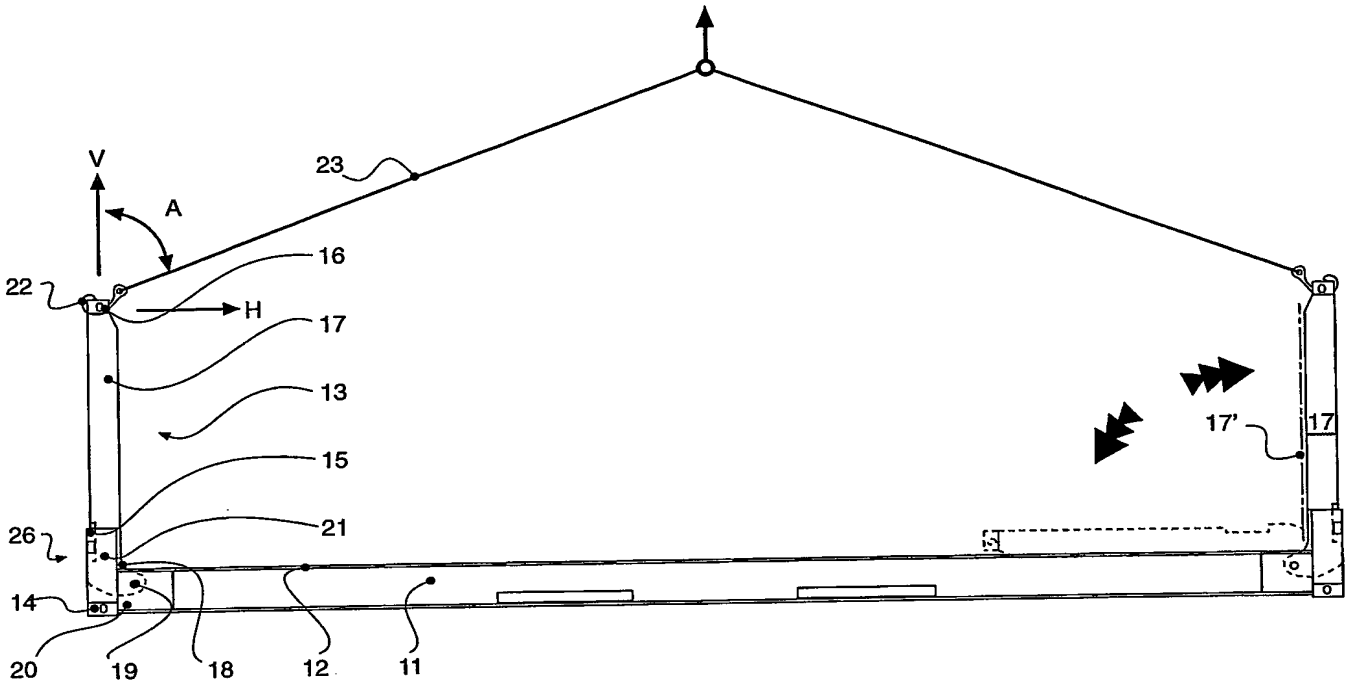


Figure 1

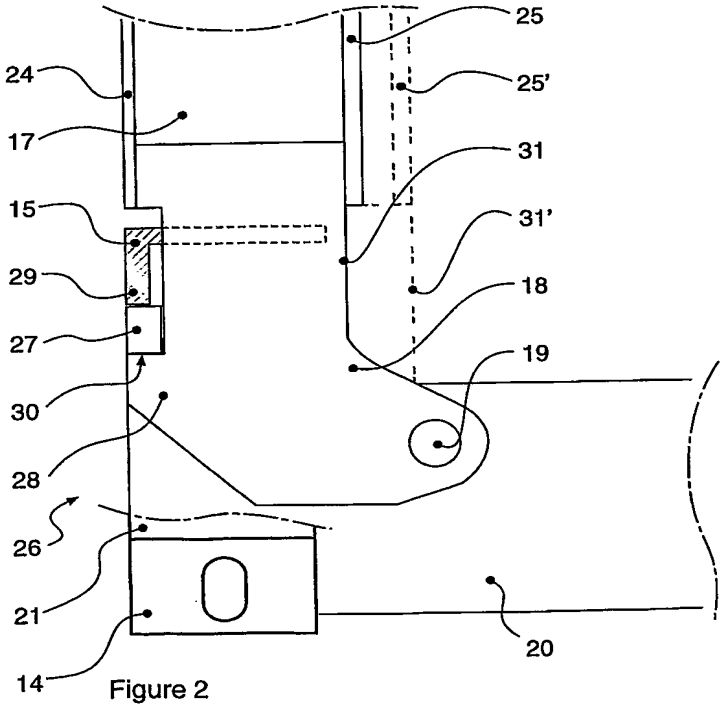


Figure 2

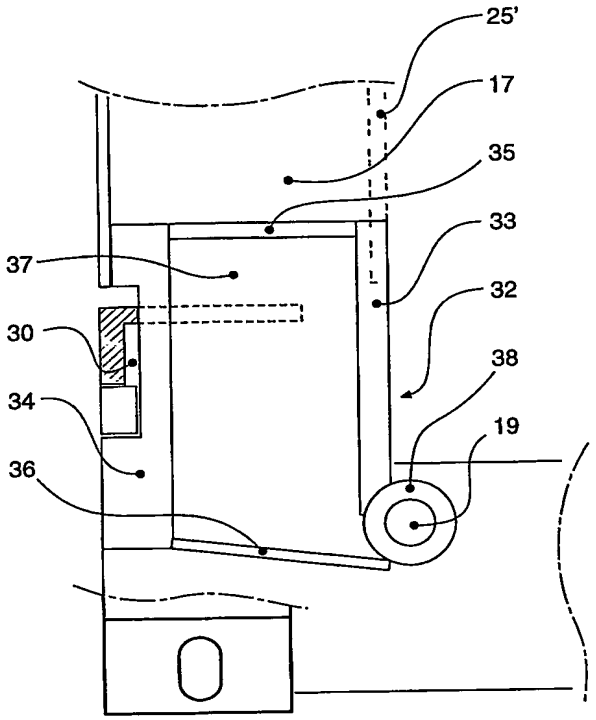


Figure 3

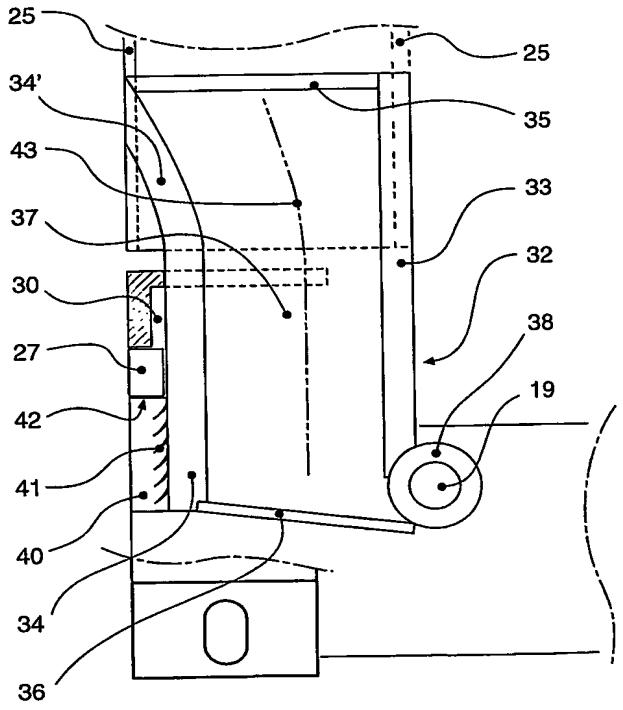


Figure 4

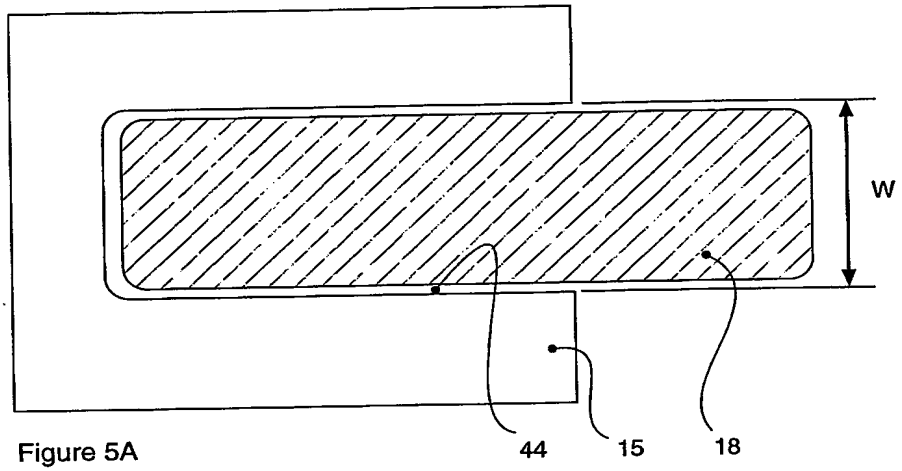


Figure 5A

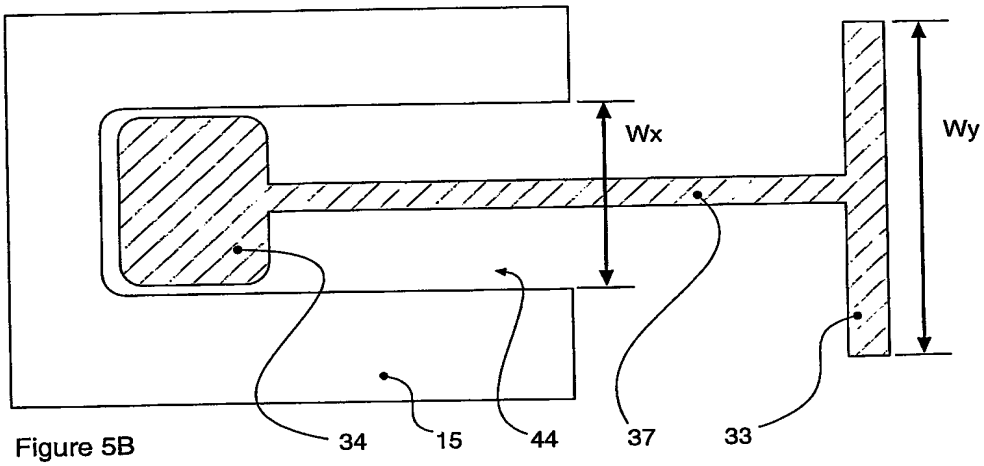


Figure 5B

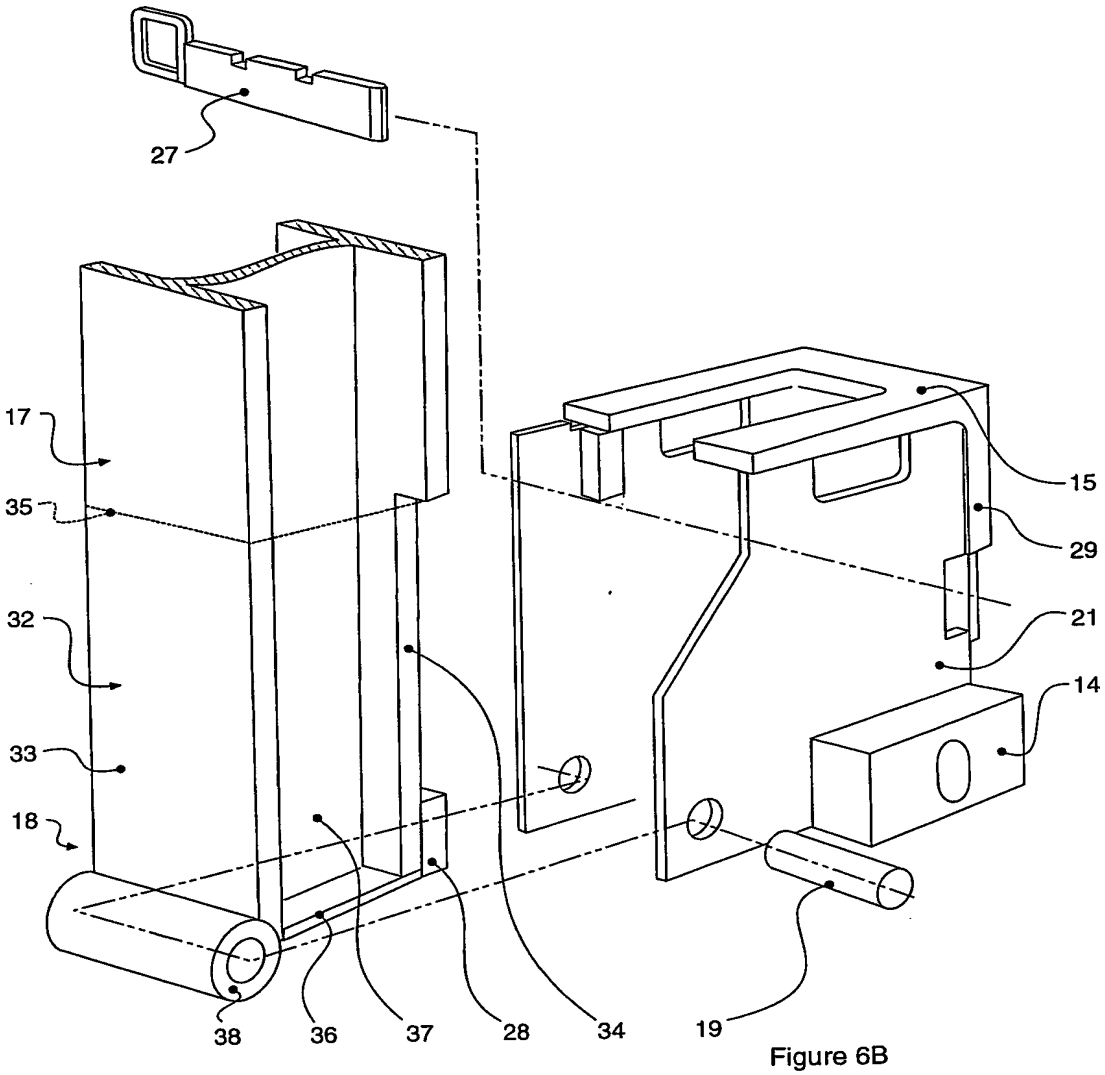


Figure 6A

Figure 6B

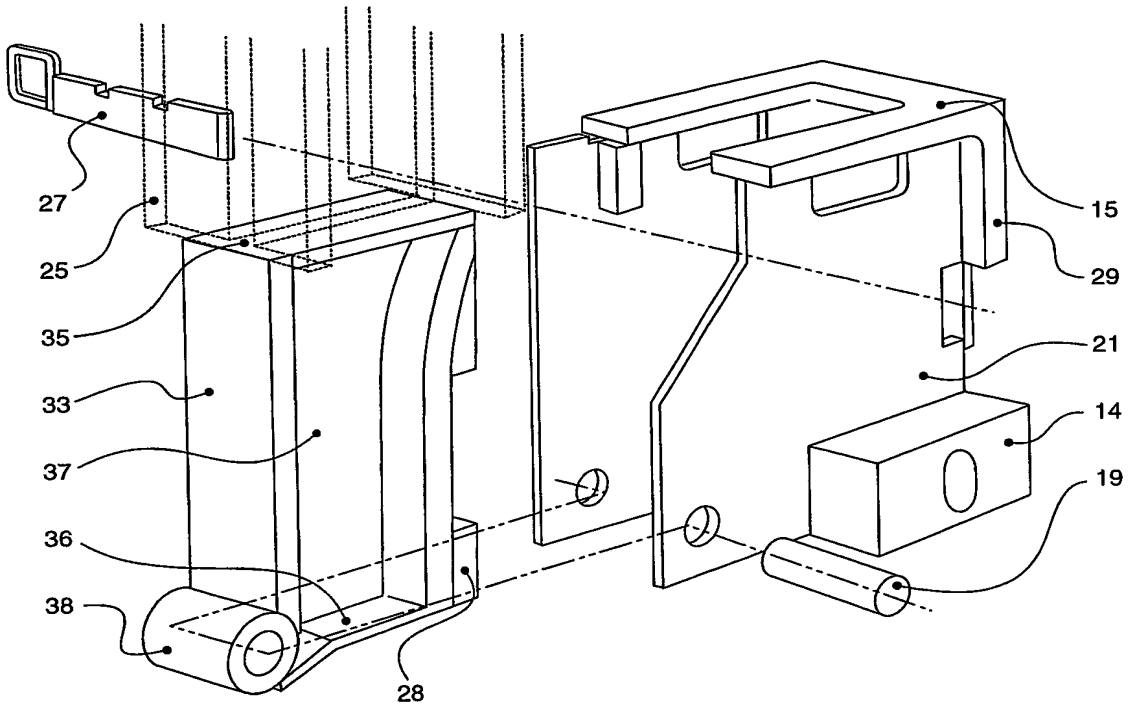


Figure 7A

Figure 7B

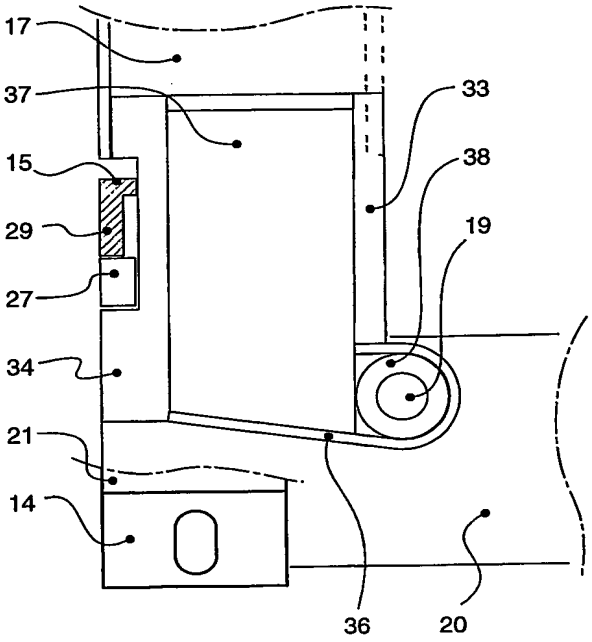


Figure 8A

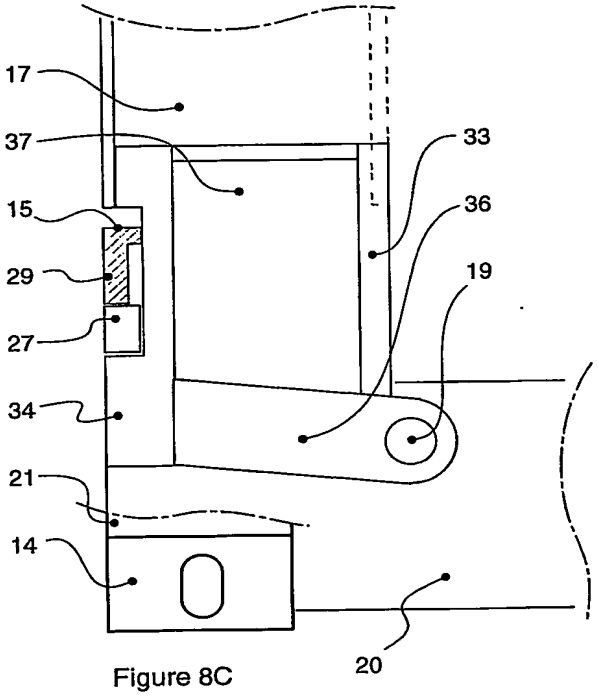


Figure 8C

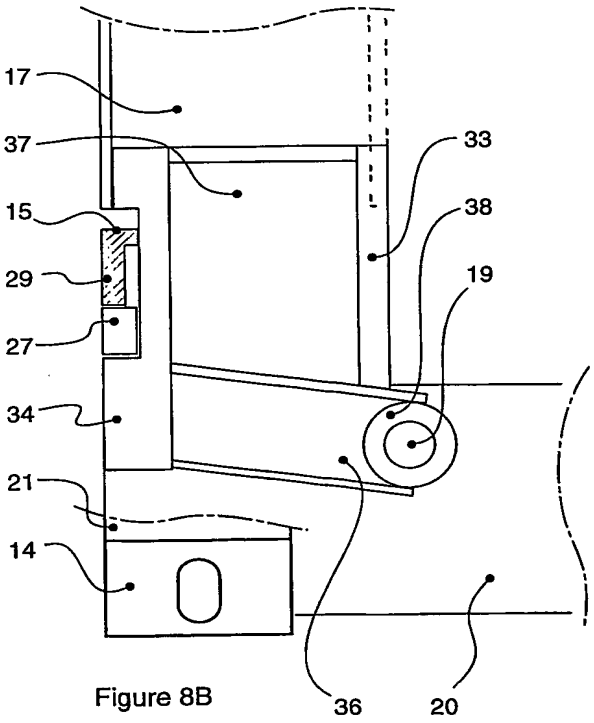


Figure 8B

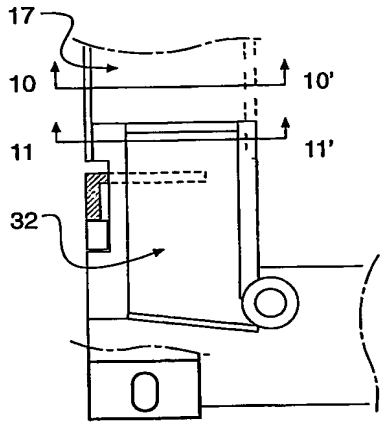


Figure 9

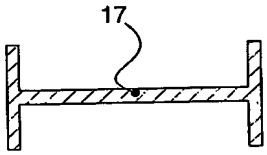


Figure 10A

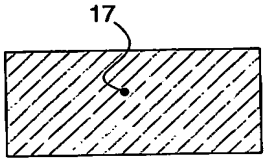


Figure 10B

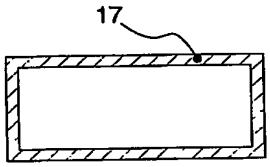


Figure 10C

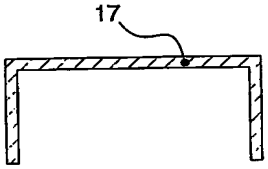


Figure 10D

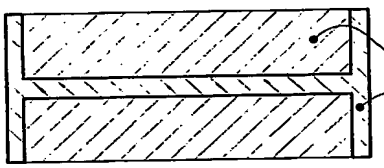


Figure 11A

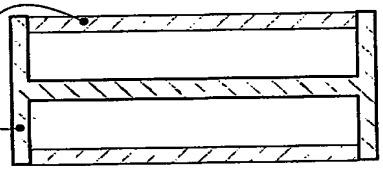

Figure 11B

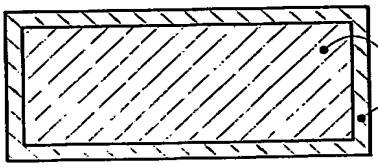


Figure 11C

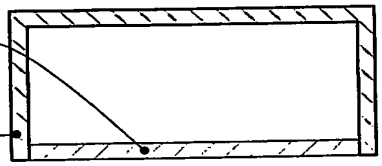

Figure 11D

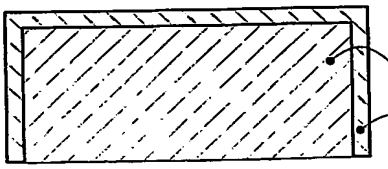


Figure 11E

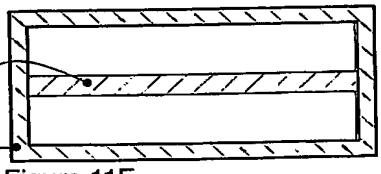

Figure 11F

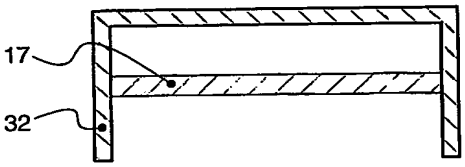


Figure 11G

# INTERNATIONAL SEARCH REPORT

Intern[illegible]al Application No
PCT/GB 03/00146

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B65D88/12 B65D88/52 E05D5/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B65D E05D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category ° | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| X | US 5 755 472 A (CLIVE-SMITH MARTIN)<br>26 May 1998 (1998-05-26)<br>abstract; figure 2 | 1,2,10,<br>11,14,15 |
| X | US 3 765 556 A (BAER A)<br>16 October 1973 (1973-10-16)<br>abstract; figures | 1,2,10,<br>11,14,15 |
| A | GB 2 361 961 A (CLIVE SMITH MARTIN<br>;KENDRICK PETER WILLIAM (GB))<br>7 November 2001 (2001-11-07)<br>abstract; figures 2A,,2B | 1,2,7,<br>10,11 |
| A | GB 2 350 862 A (POLYEARN DEV CORP)<br>13 December 2000 (2000-12-13)<br>figure 3 | 1,2 |

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| 7 May 2003 | 14/05/2003 |

| Name and mailing address of the ISA | Authorized officer |
|---|---|
| European Patent Office, P.B. 5818 Patentlaan 2<br>NL - 2280 HV Rijswijk<br>Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,<br>Fax: (+31-70) 340-3016 | Zanghi, A |

Form PCT/ISA/210 (second sheet) (July 1992)

# INTERNATIONAL SEARCH REPORT

Intern al Application No
PCT/GB 03/00146

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category ° | Citation of document, with indication,where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| A | US 4 638 744 A (CLIVE-SMITH MARTIN)<br>27 January 1987 (1987-01-27)<br>abstract; figures 3,6 | 1,2 |
| A | EP 0 408 312 A (SEAWHEEL LTD)<br>16 January 1991 (1991-01-16)<br>abstract; figures 3,4 | 1,2 |

# INTERNATIONAL SEARCH REPORT

Ir ıtional application No.
PCT/GB 03/00146

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: 1
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
see FURTHER INFORMATION sheet PCT/ISA/210

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

**Remark on Protest**

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box I.2

Claims Nos.: 1

Article 6.2.a PCT

The applicant's attention is drawn to the fact that claims, or parts of claims, relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure.

# INTERNATIONAL SEARCH REPORT

Information on patent family members

Intern al Application No
PCT/GB 03/00146

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---|---|---|
| US 5755472 A | 26-05-1998 | NONE | |
| US 3765556 A | 16-10-1973 | NONE | |
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| | | GB 2140394 A ,B | 28-11-1984 |
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| EP 0408312 A | 16-01-1991 | EP 0408312 A2 | 16-01-1991 |
| | | GB 2233628 A ,B | 16-01-1991 |